Attachment 8. Economic Analysis – Water Supply Costs and Benefits

Overview

The San Francisquito Creek Flood Protection and Ecosystem Restoration Capital Improvement Project (East Bayshore Road to San Francisco Bay) would increase stream flow capacity in San Francisquito Creek from the downstream face of East Bayshore Road to San Francisco Bay. It would reduce local flood risks during storm events, as well as provide the capacity needed for upstream flood protection projects being planned by the San Francisquito Creek Joint Powers Authority (SFCJPA). Increasing the Creek's flow capacity from San Francisco Bay to Highway 101 would be achieved by widening the Creek channel within the reach to convey peak flows for 100-year storm events, removing an un-maintained levee-type structure downstream of Friendship Bridge to allow flood flows from the Creek channel into the Palo Alto Baylands Preserve north of the Creek, and configuring flood walls in the upper part of the reach for consistency with structure for Caltrans' enlargement of the Highway 101/East Bayshore Road Bridge over San Francisquito Creek. Project elements include flood walls in the upper project reach downstream of East Bayshore Road, levee setbacks and creek widening in the middle reach between East Palo Alto and the Palo Alto Municipal Golf Course, and an overflow terrace at a marsh elevation along the Baylands Preserve.

The proposed project is Phase 1 of the full, two-phased project. Phase 1 involves creating a new setback levee and excavating the levee on the Santa Clara side, breaching the northern-most levee, as well as excavation of fluvial sediments from marshplain elevation throughout the Phase 1 and Phase 2 project reaches. Phase 2, to be completed at a later date, will include implementation of a new floodwall in the upstream portion of the project reach and a tie-in to Caltrans enlargement of the Highway 101/East Bayshore Road Bridge over San Francisquito Creek.

The project costs and avoided damages estimated in this attachment are limited to those damages that would be avoided through implementation of the Phase 1 project. Potential costs and benefits associated with Phase 2 of the project have not been included. As a result, all of the estimated benefits identified herein would be realized through implementation of Phase 1 as a stand-alone project, and do not depend upon implementation of future project phases.

Project costs and benefits are summarized in Table 8-1, below. Water supply benefits are described in further detail in Attachment 8, and Water Quality and Other Benefits are summarized in Attachment 9.

Table 8-1: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$16,858,498
Monetizable Benefits	
Flood Damage Reduction (Attachment 7)	$20,083,637
Water Supply Benefits (Attachment 8)	N/A
Water Quality and Other Benefits	$14,227,936
Total Monetized Benefits	$34,311,573
Qualitative Benefit or Cost	Qualitative indicator*
Water Supply Benefits (Attachment 8)	N/A
Water Quality and Other Benefits	N/A
Improved In-Stream Water Quality	+
Surface Water Quality Protection	+
Enhanced Recreational Opportunities	+
Enhanced Public Health Protection	++
Reduced Street Maintenance Requirements	+
Improved Water Quality	+
Enhanced Recreational Opportunities	+

O&M = Operations and Maintenance

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.

++ = Likely to increase net benefits significantly.

– = Likely to decrease benefits.

– – = Likely to decrease net benefits significantly.

U = Uncertain, could be + or –.

Economic Costs

Total capital costs for the project amount to $16,700,000 (2009 USD), to be expended between 2009 and 2014 (Attachment 4, DWR Table 6). These costs include $700,000 in sunk costs. These costs were all incurred following September 30, 2008, and include project planning, design, and environmental documentation. Because these items have no salvage value, and are therefore considered sunk costs, they have not been included in column B of DWR Table 10 (at the end of this section). Capital costs entered in DWR Table 10 total $16,000,000, and will be expended between 2011 and 2014. Construction of flood protection project elements will be completed in 2012. Capital costs for 2013 and 2014 include prepping the site for Phase 2 of the project. Once the project is in place and operational (beginning in 2012), $100,000 per year is anticipated to be required for administration and oversight, and $150,000 per year will be required for routines inspections and periodic maintenance activities, for a total of approximately $250,000 per year in operations and maintenance costs, beginning in 2012.

Over the 50-year anticipated project lifetime, the present value costs amount to $16,858,498, as shown in DWR Table 14 at the conclusion of this section.

Description of Water Supply Benefits with Project

This project is not expected to generate water supply benefits.

Timing of Benefits

Project construction will be completed in 2013, and preparation for Phase 2 efforts will continue through 2014. For this analysis, a 50-year useful project life is assumed, thus benefits and costs are calculated through 2064 (50 years after the Phase 2 preparations are completed).
Uncertainty of Benefits and Adverse Effects

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In most cases, omissions lead to a downward bias in benefits: the project is expected to be much more beneficial than the subset of benefits that can be monetized would indicate. Several of these issues are listed in Table 8-2. Adverse effects associated with project implementation are expected to be limited to temporary construction-related impacts.

Table 8-2: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	**Likely Impact on Net Benefits***	*Comment*
Flood damages	U	Fairly conservative assumptions were used to estimate the value of the combined assets at risk and the probability of levee overtopping over the coming 50 years. Whether these assumptions lead to an over- or under-estimate of expected damages is unknown.
Project costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

*Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Documentation Supporting Benefits

Not applicable

Economic Benefit Tables

Capital costs for the project amount to $16,858,498 in present value terms, as shown in DWR Table 14. This includes initial spending starting in 2011 and continuing through the end of 2014. The project lifetime is expected to be 50 years, and annual administration costs of $100,000 per year and maintenance costs of $150,000 per year are anticipated once the flood protection elements of the project are completed in 2012. Following completion of the major flood protection elements, additional work will be completed to prepare the site for Phase 2 of the project.

As described above, this project is not expected to provide water supply benefits. As such, DWR Tables 15 through 17 have been omitted. DWR Table 18 is provided, showing a total expected water supply benefit of $0.

DWR Table 14: Annual Costs
San Francisquito Creek Flood Protection and Ecosystem Restoration Capital Improvement Project

	Initial Costs	Operations and Maintenance Costs						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost	Admin.	Ops.	Maint	Replace	Other	Total Costs (a) +…+ (f)	Discount Factor	Discounted Costs (g) x (h)
2009							$0	1.000	$0
2010							$0	0.943	$0
2011	$500,000						$500,000	0.890	$444,998
2012	$13,500,000	$100,000	$150,000				$13,750,000	0.840	$11,544,765
2013	$1,000,000	$100,000	$150,000				$1,250,000	0.792	$990,117
2014	$1,000,000	$100,000	$150,000				$1,250,000	0.747	$934,073
2015		$100,000	$150,000				$250,000	0.705	$176,240
2016		$100,000	$150,000				$250,000	0.665	$166,264
2017		$100,000	$150,000				$250,000	0.627	$156,853
2018		$100,000	$150,000				$250,000	0.592	$147,975
2019		$100,000	$150,000				$250,000	0.558	$139,599
2020		$100,000	$150,000				$250,000	0.527	$131,697
2021		$100,000	$150,000				$250,000	0.497	$124,242
2022		$100,000	$150,000				$250,000	0.469	$117,210
2023		$100,000	$150,000				$250,000	0.442	$110,575
2024		$100,000	$150,000				$250,000	0.417	$104,316
2025		$100,000	$150,000				$250,000	0.394	$98,412
2026		$100,000	$150,000				$250,000	0.371	$92,841
2027		$100,000	$150,000				$250,000	0.350	$87,586
2028		$100,000	$150,000				$250,000	0.331	$82,628
2029		$100,000	$150,000				$250,000	0.312	$77,951
2030		$100,000	$150,000				$250,000	0.294	$73,539
2031		$100,000	$150,000				$250,000	0.278	$69,376
2032		$100,000	$150,000				$250,000	0.262	$65,449
2033		$100,000	$150,000				$250,000	0.247	$61,745

DWR Table 14: Annual Costs
San Francisquito Creek Flood Protection and Ecosystem Restoration Capital Improvement Project

	Initial Costs	Operations and Maintenance Costs						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost	Admin.	Ops.	Maint	Replace	Other	Total Costs (a) +…+ (f)	Discount Factor	Discounted Costs (g) x (h)
2034		$100,000	$150,000				$250,000	0.233	$58,250
2035		$100,000	$150,000				$250,000	0.220	$54,953
2036		$100,000	$150,000				$250,000	0.207	$51,842
2037		$100,000	$150,000				$250,000	0.196	$48,908
2038		$100,000	$150,000				$250,000	0.185	$46,139
2039		$100,000	$150,000				$250,000	0.174	$43,528
2040		$100,000	$150,000				$250,000	0.164	$41,064
2041		$100,000	$150,000				$250,000	0.155	$38,739
2042		$100,000	$150,000				$250,000	0.146	$36,547
2043		$100,000	$150,000				$250,000	0.138	$34,478
2044		$100,000	$150,000				$250,000	0.130	$32,526
2045		$100,000	$150,000				$250,000	0.123	$30,685
2046		$100,000	$150,000				$250,000	0.116	$28,948
2047		$100,000	$150,000				$250,000	0.109	$27,310
2048		$100,000	$150,000				$250,000	0.103	$25,764
2049		$100,000	$150,000				$250,000	0.097	$24,306
2050		$100,000	$150,000				$250,000	0.092	$22,930
2051		$100,000	$150,000				$250,000	0.087	$21,632
2052		$100,000	$150,000				$250,000	0.082	$20,407
2053		$100,000	$150,000				$250,000	0.077	$19,252
2054		$100,000	$150,000				$250,000	0.073	$18,163
2055		$100,000	$150,000				$250,000	0.069	$17,134
2056		$100,000	$150,000				$250,000	0.065	$16,165
2057		$100,000	$150,000				$250,000	0.061	$15,250
2058		$100,000	$150,000				$250,000	0.058	$14,386
2059		$100,000	$150,000				$250,000	0.054	$13,572
2060		$100,000	$150,000				$250,000	0.051	$12,804
2061		$100,000	$150,000				$250,000	0.048	$12,079
2062		$100,000	$150,000				$250,000	0.046	$11,395
2063		$100,000	$150,000				$250,000	0.043	$10,750
2064		$100,000	$150,000				$250,000	0.041	$10,142
Project Life	50 Years							…	
								Total Present Value of Discounted Costs (Sum of Column (i))	**$16,858,498**
								Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries	

Comments:
Annual administration and maintenance costs includes routine inspections and upkeep. All costs are in 2009 dollars.

DWR Table 15: Annual Water Supply Benefits
San Francisquito Creek Flood Protection and Ecosystem Restoration Capital Improvement Project

NOT APPLICABLE

DWR Table 16: Annual Costs of Avoided Projects
San Francisquito Creek Flood Protection and Ecosystem Restoration Capital Improvement Project

NOT APPLICABLE

DWR Table 17: Annual Other Water Supply Benefits
San Francisquito Creek Flood Protection and Ecosystem Restoration Capital Improvement Project

NOT APPLICABLE

DWR Table 18: Total Water Supply Benefits
San Francisquito Creek Flood Protection and Ecosystem Restoration Capital Improvement Project

Total Discounted Water Supply Benefits	Total Discounted Avoided Project Costs	Other Discounted Water Supply Benefits	Total Present Value of Discounted Benefits (a) + (c) or (b) + (c)
(a)	(b)	(c)	(d)
$0	$0	$0	$0
Comments:			